DOCUMENT RESUME

ED 322 142 SP 032 550

TITLE	Manitoba Schools Fitness 1989.
INSTITUTION	Manitoba Dept. of Education, Winnipeg.
REPORT NO	ISBN-0-7711-0802-8
PUB DATE	89
NOTE	54p.; Color shading in charts may cause readability problems.
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Athletics; *Body Composition; *Cardiovascular System; Elementary Secondary Education; Exercise; Foreign Countries; Health Promotion; *Muscular Strength; Physical Education; *Physical Fitness; *Tests

ABSTRACT

This manual outlines physical fitness tests that may be used in the schools. The tests are based on criterion standards which indicate the levels of achievement at which health risk factors may be reduced. Test theory, protocols, and criterion charts are presented for: (1) muscle strength and endurance, (2) body composition, (3) flexibility, and (4) cardiovascular endurance. Graphs illustrate the desirable levels of achievement for these tests as well as levels which indicate a need for improvement. A sample student evaluation card and class composite record are included as well as a glossary of terms. (JD)

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MANITOBA SCHOOLS FITNESS

ED322142

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Manitoba Education and Training

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Manitoba
Education
and Training

ISBN 0-7711-0802-8

ACKNOWLEDGEMENTS

Manitoba Education wishes to express its appreciation to the following for their guidance in the development of this manual.

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Special thanks to the following for their assistance and advice:

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Photo Credits

Manitoba Education would like to thank Jennifer Campbell, Al Dixon and students from St. John's High School for the photographs that appear in this manual.

PREFACE

Societal needs and expectations are changing. In the last few years, the leading cause of death has changed from infectious diseases to diseases influenced by lifestyle. Making the right choices early in life can determine, to a degree, the likelihood of developing problems related to hypertension, obesity, elevated serum cholesterol and cardiovascular disease. It has been recognized that one of the key factors to a healthy lifestyle is physical activity. **The benefits of regular exercise are well known.** Information from the Quality Daily Physical Education Program sponsored by the Canadian Association for Health, Physical Education and Recreation in conjunction with Fitness Canada, states that "research shows that students receiving quality daily physical education have better health, are less susceptible to stress, are more independent, play better with others, and are less aggressive."

Regular physical activity and other positive health habits can add measurably to an increased quality of life. It is essential that children be exposed early to health-related activities and concepts to ensure a full and rewarding life. Youth should be educated to value, appreciate and understand health-related fitness and performance objectives. They should be encouraged to achieve and maintain desirable fitness levels based on the health standards found in this manual.

To produce this manual, committee members analyzed data from a variety of fitness resources including MANFIT, CAHPER PERFORMANCE II, AAHPERD's HEALTH-RELATED FITNESS TEST, PHYSICAL BEST, FIT YOUTH TODAY and a host of recent research articles written on health/fitness. Based on this information, they established criterion standards to indicate the levels of achievement at which health risk factors may be reduced.

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INTRODUCTION

PHYSICAL FITNESS TESTING

Physical Fitness Testing Project

During the period 1959-64 public concern was expressed about the physical fitness of school children. The concern gave rise to a number of studies and projects. Fitness testing programs conducted to assess the fitness of Manitoba youth were **The Physical Fitness Testing Project** sponsored by the Manitoba branch of the Canadian Association for Health, Physical Education and Recreation (1959); and the G. R. Cumming **Physical Fitness Studies of Winnipeg School Children (1964 and 1966),** funded by the National Fitness and Amateur Sport Directorate.

CAHPER Fitness Performance I

In 1963 the Canadian Association for Health, Physical Education and Recreation requested its Research Committee to design a project which would establish national norms for Canadian children, 7-17 years of age. The tests were administered by a specially trained team that travelled throughout Canada. The data were processed and national norms published in 1966.

Centennial Fitness Awards Program

A national focus on fitness was given added impetus in 1966 with the announcement by the Canadian Centennial Commission of a Physical Fitness Incentive Awards project. Youth across Canada participated in unprecedented numbers. Centennial crests were awarded for achievement and participation.

Manitoba Physical and Motor Fitness Performance Test

In 1967 Manitoba data from the Canadian Centennial Athletic Awards Program were statistically analyzed and provincial norms developed.

Manitoba Centennial (1970) Athletic Awards

An investigation and statistical analysis of data from 70,000 participants in the Manitoba Centennial Program "Fit for 70" resulted in the development of new Manitoba norms. Height and weight data were included and a statistical comparison made of the test items between 1967 and 1970.

Manitoba Schools Physical Fitness Survey

Over 10,000 school children from the ages of 5-18 were tested in Manitoba during 1976-77. The province was divided into nine geographical regions. One or more schools were randomly selected out of each region so that all grades would be represented. Approximately 600 students were surveyed in each age group. As a result of the survey, it was possible to develop the first Manitoba Physical Fitness Performance Test Manual and Fitness Objectives. The Manual specified test procedures and desirable fitness objectives. An adjunct microcomputer program entitled MANFIT was developed to provide student motivation. The survey also assessed the relationship of fitness to student lifestyles and academic performance.

Conclusion

Historically, physical fitness testing in Manitoba has striven to motivate teachers and students to improve their personal fitness.

IT IS TIME FOR A CHANGE!

The goal of the Manitoba Schools Fitness Program is to establish positive attitudes and lifestyle habits that are conducive to "healthy living."

Teachers are encouraged to emphasize and teach toward the long-term benefits of **total fitness.** Counselling students to better fitness is essential.

The criterion-reference charts at the back of this document display health fitness levels that can be used in determining the physical fitness components that a participant needs to improve.

The test battery is comprised of four core and three optional items.

Core Items

- push-ups
- sit-ups
- sit and reach
- 1600 metre run

Optional

- height
- weight
- body composition

The committee responsible for this health fitness manual have selected tests that should be valid, accurate measurements of fitness and constant throughout an individual's lifetime.

CHANGE IS INEVITABLE!

HEALTH AND SPORT PERFORMANCE

The intent of this program is to focus on health/fitness related objectives rather than sport skill related tests. Students should be encouraged to assess themselves and understand that they are not competing against other students or for better grades. Sport-specific tests are available from numerous amateur sport organizations.

HEALTH-RELATED FITNESS

In this program, the focus has shifted from performance-based standards to more **health-related** standards. Several factors have encouraged this change:

- promotion of healthy lifestyles
- recognition of individual differences and fostering of self-esteem
- change to criterion-referenced measurements
- movement away from using test scores for the purpose of grading

ADAPTED PHYSICAL EDUCATION

Special needs students should be encouraged to take part in all facets of the fitness program. However, teachers will have to learn to adapt test items to meet individual needs. Fitness evaluation and teaching should take part within an integrated setting.

Teachers are well advised to know the constraints that some students will encounter within their programs vis-a-vis physical disability, behavioral and medical disorders.

Included in all student education plans should be information on:

1. the student
2. all students' individual needs
3. follow-up
4. parental interest or involvement in the process

EARLY YEARS FITNESS: A NEED TO TEST?

The development and teaching of fitness skills and concepts is an important aspect of the early years curriculum. However, formal fitness testing is not recommended for the following reasons.

1. Testing is irrelevant to young children.
2. Young children are at varying stages of growth and development.
3. Administration of testing is difficult, if not impossible.
4. Motivation is lacking due to short attention spans and a strong play urge.

Fitness testing after the early years will alleviate most of the above problems as children will then be physically and mentally ready. They can also score each other and assist in administration. Motivation will be easier as the children can understand and will focus on a given task. Most important, children will then be able to have some insight into the value of the life benefits of physical fitness.

FITNESS EVALUATION: A POSITIVE APPROACH

Physical fitness evaluation should be an integral part of a comprehensive program of physical education. **It should be used as a means to teach fitness concepts and their relationship to health, work and the quality of life.** Evaluation can provide objective information and motivation for teachers and students. The following should be considered in evaluating student fitness.

1. **Selection**

   Although this manual suggests the use of specific fitness tests, teachers should acquaint themselves with alternatives. Alternative test batteries should be discussed with students to allow them some choice as long as the objective is achieved.

2. **Preparation**

   It is important that students be prepared to participate in the evaluation and be able to understand the value of testing. Concepts of fitness should be discussed, test procedures demonstrated and self-motivation techniques encouraged to stress the importance of doing the best that they can as individuals.

   Students should experience progressive activity prior to the teacher's administering of the fitness battery. **Concepts of warm up, cool down and pacing should be taught and practiced.**

   A time-flexible testing schedule should be presented to the students to allow maximum opportunity for evaluation. This will accommodate students that are absent, on medication, "not feeling well," or wanting to be retested.

   Students should be screened for medical conditions prior to participating in the testing schedule.

3. **Interpretation**

   Discuss results **immediately** after the tests have been completed. Students with low fitness scores should be individually counselled, if possible. Reporting should stress maintenance or improvement. **Fitness test results should not be used for grading in physical education.** Reporting to parents is desirable.

4. **Follow-up**

Instructional and intramural programs should be designed to help students with low fitness levels. Programs should be personalized where possible and self testing encouraged.

Periodic evaluations should be planned in order to assess each student's improvement during the year.

CRITERION-REFERENCED MEASUREMENT

To date, most published tests in physical education are norm referenced (NR), especially those dealing with the evaluation of physical fitness. While NR tests are appropriate for selection and prediction purposes, they are not suitable for evaluations in education. A measurement that most physical educators should be interested in is one that does not limit the number of students that might be able to achieve a desired trait. The **criterion-referenced (CR)** measurement theory is a test technology that does not place these same limitations upon student performances.

While NR tests differentiate individual differences and tell us what is, they do not provide good diagnostic feedback or tell us what ought to be. CR tests, on the other hand, provide us with this information. With CR measurement we are able to inform students of the relationship of their present performance with that of a desired performance. As a result, this fitness assessment battery uses the CR measurement theory to provide physical educators and students with the tools they require to make appropriate fitness evaluations.

ADMINISTRATIVE SUGGESTIONS

Arranging for Assistance

- student leaders (credit option and older students) can assist with testing and recording
- classroom teachers may be asked to assist
- parent volunteers may also be asked to help (training may be required)

Schedule Testing to Best Utilize Time

- during regular physical education classes
- before and after school or during the noon hour
- continually during the year so that students may be assisted on a regular basis
- at times appropriate for self testing
- as homework assignments to be completed with the cooperation of parents (best suited to students reluctant to be evaluated)

Plan to Maximize Use of Resources

- use a circuit approach that allows student rotation
- use larger time blocks and staff assistance (several classrooms can be tested at one time. Do the entire school in ONE Day!)
- prepare the students and provide a "trial" run
- teach leaders proper test protocols
- prepare score sheets
- be consistent

Motivation

- provide encouragement
- create a relaxed, friendly atmosphere
  play music
  test in other environments (multi-purpose room, etc.)
  encourage staff to participate

TEST THEORY, PROTOCOLS AND CRITERION CHARTS

MUSCLE STRENGTH AND ENDURANCE
(PUSH-UPS AND MODIFIED SIT-UPS)

DEFINITIONS

MUSCLE STRENGTH

The maximum force that can be exerted in a single effort.

MUSCLE ENDURANCE

The ability of a muscle or group of muscles to exert force over an extended period of time.

TEACHING CONCEPTS

PHYSIOLOGY

1. Anatomy
   a. Ligaments hold bones together at joints.
   b. Tendons attach muscles to bones.
   c. Muscles move bones which create body movement.
2. Muscles are composed of many fibres.
3. Muscle fibres are grouped into motor units (neural components).
4. Where the difficulty of the exercise is increased, more motor units are called upon to perform that exercise.
5. Regular resistance exercise will:
   a. Enlarge and strengthen muscle fibres
   b. Improve nervous function
   c. Improve blood supply

TRAINING PRINCIPLES

Overload

- Increase the resistance to develop strength.
- Increase resistance gradually as strength improves.
- Decrease the resistance and gradually increase the repetitions to develop endurance.

Specificity

- To develop strength make muscles work against a heavy resistance. To develop endurance make muscles work repeatedly against resistance. Activities:

a. Calisthenics

Use own body weight in push-ups, pull-ups, sit-ups, dips

b. Submaximal Weight Training/Resistance Training

Control resistance
Work specific muscles
Not recommended for young children

Maintain good body mechanics to prevent injury and to work the intended muscle.

Progression

- To develop strength and endurance,

  a. add weight - increase the resistance
  b. perform more repetitions
  c. work the muscle more often - increase from 2 workouts per week to 3 per week

Regularity

- To develop strength and endurance exercise every second day.

BENEFITS OF STRENGTH AND ENDURANCE

1. Increase success in all physical activity
2. Contribute to good posture
3. Prevent and alleviate low back pain
4. Allow daily activities to be conducted with more ease
5. Allow body weight to be manipulated more efficiently

It is important to develop all of the muscles and to maintain a balanced development.

IMPLICATIONS

1. The use of weights requires that teachers provide adequate preliminary instruction.

2. Body weight is the recommended resistance for young children.

NOTE: The use of heavy weights is not recommended for participants.

PUSH-UPS

FITNESS COMPONENT: UPPER BODY STRENGTH/ENDURANCE

EQUIPMENT: GYM MATS

TEST DESCRIPTION

1. The participant assumes a front lying position on the mat with **hands placed under the shoulders,** fingers pointed forward, legs straight and together with toes tucked under so they are in contact with the testing surface.

2. The participant pushes until the arms are fully extended, keeping legs and back straight.

3. The participant lowers the body, using the arms, keeping the back in a straight line from head to toes, until the elbows reach 90 degrees (see administrative suggestions) and the upper arms are parallel to the floor.

Note

1. Participants should know that:

   a. A complete push-up is counted by a partner when the participant's elbow reaches 90 degrees and upper arms are parallel to the floor.

   b. There is no time limit to the test, but push-ups must be performed rhythmically and continuously.

2. The test is terminated if:

   a. The participant is experiencing pain or severe discomfort.

   b. The participant is unable to maintain a continuous rhythmic movement.

   c. The participant displays poor technique (see test description) after a maximum of 3 corrections by examiner.

ADMINISTRATIVE SUGGESTIONS

1. Have the participant perform push-ups in a rhythmical movement (up count equal to down count).

2. Have the participants work in partners.

3. Have the partner count only the push-ups which are correctly demonstrated.

4. Allow participants an opportunity to experience the correct technique for the push-up prior to performance day.

Note

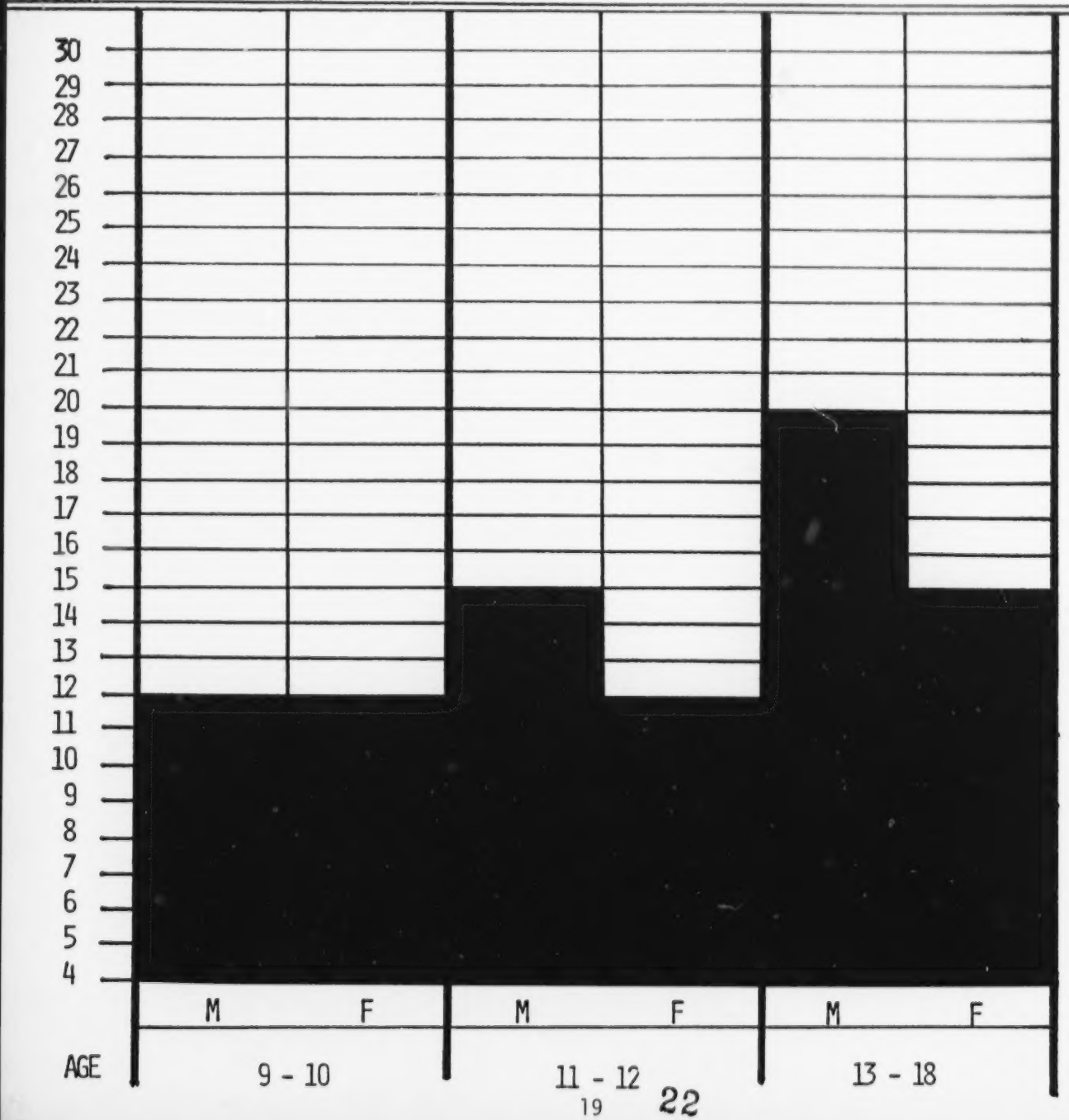
A 90 degree elbow bend can be achieved if the participant lowers the body, keeping legs back and head in line and touches the forehead to the partner's fist resting thumb-side up on the mat.

OR

Partner checks for 90 degree accuracy and places a hand under the shoulder or chest of the participant at a height where 90 degrees is attained. During the push-up the participant must lower him- or herself only enough to contact the partner's hand.

MUSCLE STRENGTH / ENDURANCE
PUSH UP

WHITE - DESIRABLE LEVEL
RED - REQUIRES IMPROVEMENT
GRAPH INTERPRETATION SEE APPENDIX



MODIFIED SIT-UPS

FITNESS COMPONENT: ABDOMINAL AREA MUSCULAR ENDURANCE AND STRENGTH

EQUIPMENT: GYM MATS, STOP WATCH

TEST DESCRIPTION

1. Participants are instructed to lie on their backs with knees flexed, feet flat on testing surface and heels between 30 cm (12") and 45 cm (18") from the buttocks.

2. The arms are crossed on the chest with the hands on the opposite shoulders.

3. The feet are to be held flat by a partner or a support device, in touch with the testing surface (see Administrative Suggestions).

4. Participant is to commence on the command "ready?...go."

5. The participant curls to a sitting position, maintaining hand contact with the shoulders. The sit-up is completed when the elbows touch the thighs.

6. The participant then returns to the down position until the back contacts the testing surface.

7. The participant is to repeat the sit-up as many times as possible in the one-minute time limit, or until the desired fitness goal is achieved.

8. The partner counts each complete sit-up, then records the score.

9. Rest between sit-ups is allowed in either the up or down position.

Note

The test is terminated prior to the one-minute time limit if:

a. Severe discomfort or pain are experienced.

b. The participant consistently displays poor technique after a maximum of three (3) corrections by the examiner.

ADMINISTRATIVE SUGGESTIONS

1. Participants should have the opportunity to experience correct technique of the modified sit-up prior to performance day.

2. Participants should be reminded to maintain hand contact with the shoulders at all times.

3. Participants' partners should apply only enough pressure to maintain feet contact with the floor.

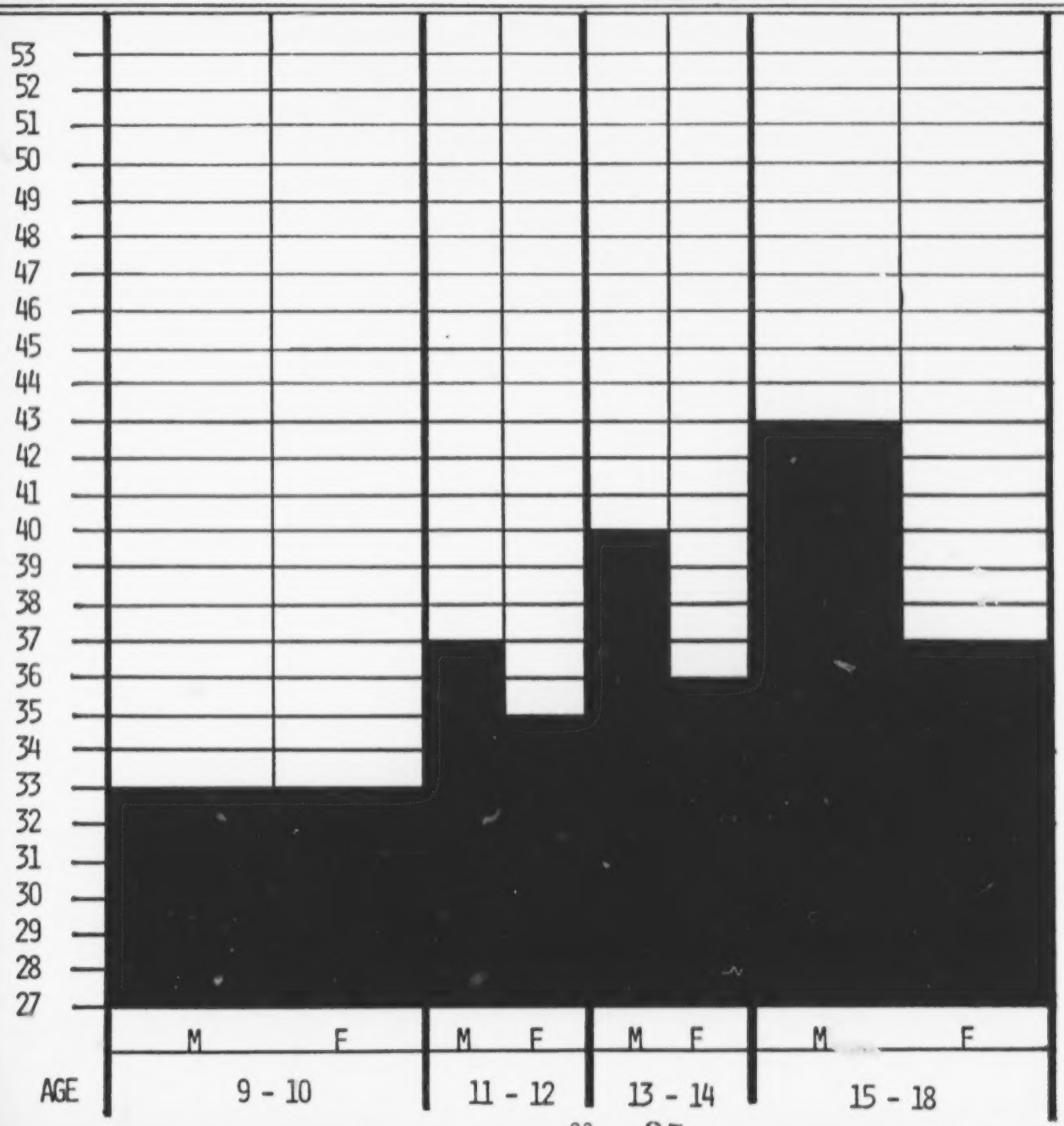
The review committee recognizes the controversial nature of strength endurance testing of the abdominal area.

Following a thorough review of literature, the committee determined that the modified sit-up is the most practical and reliable test to use in the school system at this time.

MUSCLE STRENGTH / ENDURANCE

THE SIT - UP

WHITE - DESIRABLE LEVEL
RED - REQUIRES IMPROVEMENT
GRAPH INTERPRETATION SEE APPENDIX



BODY COMPOSITION

DEFINITION

Body composition refers to the relative amounts of muscle, bone and fat in the body.

TEACHING CONCEPTS

PHYSIOLOGY

1. Distinction of Weight and Composition

   a. Body weight is very misleading as it is possible to have two individuals that are the same weight, and yet one individual may be obese whereas the other is not.

   b. Body composition refers to relative body fat--i.e., how much of an individual's body is lean tissue and how much is fat tissue.

2. Distinction between Overweight, Over-fat, Obesity

   While there is a definite relationship among the three terms, they cannot be used synonymously.

   a. Overweight simply means that an individual weighs more than most people of the same gender, height and body frame.

   b. Over-fat means that an individual has more fat than he or she should.

   c. Obesity is a medical disorder associated with being over-fat.

3. Relationship of Lean Mass to Body Fat

   a. Lean mass is found mostly in bones and muscle.

   b. Most fat is stored in adipose tissue found beneath the skin and around body organs.

   c. Lean mass is denser and weighs more.

   d. Fat is less dense and weighs less.

4. Food Imbalance

   Weight gain or loss is caused when there is an imbalance of calories consumed and those expended. .45 kilograms (one pound) of body weight is approximately equal to 15,000 kilojoules (3500 calories).

   Caloric intake is through the food consumed and expenditure is through activity done.

   If caloric intake is greater than caloric expenditure, the body stores the excess as fat.

TRAINING PRINCIPLES

1. Methods of decreasing body fat

   a. Diet
   b. Exercise
   c. Diet and exercise

2. Benefits of weight reduction by combining diet and exercise

   By diet alone caloric intake must be reduced more than when diet with exercise are combined. This also increases the chance of nutritional deficiency. Exercise prevents the loss of lean tissue. Therefore, there is little need to alter the diet.

   Examples:

   By diet alone weight loss is approximately 60% body fat to 40% lean mass. If exercise is included with the diet, the weight loss is almost 100% body fat. In weight reduction, the loss of body fat is desirable.

3. Prolonged regular physical exercise is superior to activities of short duration. Aerobic activities are best for fat loss.

4. Weight loss should be gradual.

BENEFITS

1. Many medical disorders are related to being over-fat or under-fat.

2. Optimal levels of body fat enhance the quality of life.

IMPLICATIONS

1. Obesity is a state of being over-fat. This condition is common in Canadian youth today and is associated with:

    a. Low self-esteem
    b. Onset of diabetes
    c. Insulin disorders
    d. Cardiovascular diseases
    e. Increased resting heart rate
    f. Increased blood pressure
    g. Increased serum cholesterol levels
    h. Low levels of fitness

2. Anorexia nervosa is an emotional eating disorder in which the individual is obsessed with "thinness." Anorexics will usually starve themselves until they suffer from malnutrition.

3. Bulimia is an eating disorder characterized by recurring episodes of binge eating, i.e., the consumption of large amounts of food in short time periods. Other characteristics include attempts of severe diet restrictions, self-induced vomiting and the use of diuretics.

4. Desirable levels of body fat

    There is a relationship between inactivity, physical fitness and being over fat. Students need to be aware of this relationship to be able to evaluate their health fitness. Discourage students from participating in crash diets or unhealthy methods of weight reduction. Help them to understand that such practices can contribute to depression, loss of self-esteem or an eating disorder. Inform students of appropriate nutritional health practices and proper exercise habits to lose weight.

    On the one hand is the individual who has a high amount of body fat (obesity) and on the opposite hand the individual who has a dangerously low amount of body fat (anorexia or bulimia). There is a need to be as aware of the one as of the other.

BODY COMPOSITION

The use of any height/weight index, including the currently popular Body Mass Index, is inappropriate for individual assessment. BMI may have some value in assessment of populations of adults, but there is too much individual variation to justify its use as a tool for the counselling of children. Skinfold caliper measurement of skinfold thickness is the best approach for schools. The important questions are: which sites and how many? Measurement at two skinfold sites should be adequate for screening purposes, that is, to identify those requiring further assessment. The follow-up individual counselling should be based on at least three, preferably four skinfold sites. This strategy will be effective in detecting those children at risk for excessive leanness or fatness.

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SUM OF SKINFOLDS

FITNESS COMPONENT: BODY COMPOSITION

EQUIPMENT: SKINFOLD CALIPERS

TEST DESCRIPTION

1. The following procedure standardizes the technique for the total skinfold measurements in both the 2-site and 4-site method.

   a. Right handed testers should use the left hand and firmly grasp the skinfold between the thumb and forefinger. The lifted fold will include the underlying layer of fat.

   b. Place the contact surfaces of the calipers one centimeter (1/2 inch) below your finger, with the scale visible and the jaws of the caliper at a right angle to the body surface. The point on the fold where the reading should be taken is midway between the crest and the base of the skinfold.

   c. Close the caliper on the skinfold. Wait approximately two seconds for the indicator to stabilize and read the measurement to the nearest millimetre.

   d. Repeat the measurements (beginning at step one) so that a total of three measurements are taken for each site. The median (middle) score for each site is recorded.

2. The subcutaneous fat measurement sites and measurement techniques are illustrated in the accompanying diagrams.

   a. Triceps: measured half-way down the right arm between the tip of the acromion and top of the radius, with the fold picked up in a line passing directly up the arm from the tip of the olecranian process. The arms hang relaxed at the side.

   b. Calf: measured on the inside of the right lower leg at the largest part of the calf girth. Grasp and gently lift the skin up slightly above the level of the largest part of the calf with the thumb and index finger so that the calipers can be placed at the level of the largest part of the calf. Have the participant place the right foot on a bench with the knee slightly flexed when taking the calf measurement.

TEST DESCRIPTION

c. Bicep: the skinfold should be lifted on the front surface of the right upper arm over the prominence and middle of the biceps muscle. The arm should hang relaxed and the skinfold should be lifted parallel to the long axis of the humerus.

d. Sub-scapular: the skinfold is located just below the angle of right scapular, the fold being picked up parallel to the natural cleavage line of the skin.

e. Supra-iliac: the skinfold is located immediately above the crest of the right ilium. The fold should be lifted at a slight angle to the vertical.

3. Summation of Skinfolds

a. Two-Site Method: Add the median (middle of the three scores) for triceps to the median of the calf scores to obtain a sum of the triceps and calf measurement.

b. Four-Site Method: Add the median of the three scores for triceps, biceps, sub-iliac and sub-scapular to find the sum of the skinfold measurements.

* Refer to the corresponding Skinfold Criterion Chart.

TWO-SITE METHOD

CALF

TRICEPS

FOUR-SITE METHOD

Bicep

Tricep

Supra-iliac

Sub-scapular

ADMINISTRATIVE SUGGESTIONS

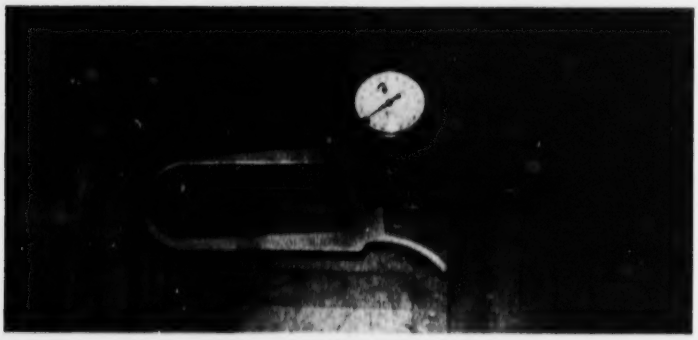
1. Volunteers administering the test should be trained in the use of skinfold calipers.

2. Participants should wear shorts and a T-shirt to allow easy access to skinfold areas.

3. If possible, more than one station should be set up.

4. Participants should be measured separately.

BODY COMPOSITION



WHITE - DESIRABLE LEVEL
RED - REQUIRES IMPROVEMENT
GRAPH INTERPRETATION SEE APPENDIX

SKINFOLD

TWO SITE METHOD

2MM
4MM
5MM
6MM
8MM
10MM
12MM
14MM
15MM
16MM
18MM
20MM
22MM
24MM
25MM
26MM
28MM
30MM
32MM
34MM
35MM
36MM
38MM
40MM
42MM
44MM

M F

AGE 9 - 18

SKINFOLD

FOUR SITE METHOD

10MM
12MM
14MM
16MM
18MM
19MM
20MM
22MM
24MM
26MM
28MM
30MM
32MM
34MM
36MM
37MM
38MM
40MM
42MM
44MM
46MM
48MM
50MM
52MM
54MM
56MM

M F

9 - 18

FLEXIBILITY

DEFINITION

Flexibility is the ability of a joint to move through a full range of motion.

TEACHING CONCEPTS

PHYSIOLOGY

Flexibility is limited by bone, muscle, ligaments, tendons and bone joint capsule.

TRAINING PRINCIPLES

1. On developing flexibility:

    a. Flexibility exercises are joint specific.

    b. Flexibility exercises should be performed daily.

    c. Slow stretching movements should be performed through a full range of motion, which provides for a permanent range of movement in joints.

    d. Stretching for warm-up reduces muscle injury, soreness and lubricates joints.

    e. Stretching for cool-down develops flexibility.

BENEFITS

1. Makes physical movements more efficient and easier to perform
2. Reduces muscle injury
3. Relieves muscle soreness
4. Decreases back problems
5. Improves posture

IMPLICATIONS

1. Flexibility is best developed in a relaxed atmosphere.

The basic theory of flexibility development is to move each body part through a full range of movement. Slow, sustained movement is better than ballistic (jerking) movements.

SIT AND REACH

FITNESS COMPONENT MEASURED: FLEXIBILITY

EQUIPMENT: FLEXOMETER

Note: A participant who suffers from lower back or knee problems should perform this test with caution.

TEST DESCRIPTION

1. Each participant, shoes off, sits with legs fully extended and with the soles of the feet placed flat against the back portion of the flexometer.

2. Feet should be placed shoulder width apart.

3. Legs must be kept straight.

4. The participant reaches forward, arms evenly stretched, palms down, index fingers in line, thumbs tucked under and both hands even along the scale.

5. The participant bends and reaches forward, without jerking, pushing along the scale with the finger tips of both hands together, as far forward as possible.

6. The participant holds this position for two (2) seconds, then returns to the upright sitting position (Count: one thousand and one, one thousand and two.)

7. The test is repeated twice and the best score recorded. The maximum distance reached is recorded as the measure of flexibility. The measurement is taken to the nearest centimeter.

ADMINISTRATIVE SUGGESTIONS

1. The trial is not counted if the knees flex.

2. Jerking, bouncing action is not allowed.

3. The sit and reach apparatus should be placed against a wall to prevent any movement in the apparatus during the testing procedures.

4. Shoulders should be forward and the head should be lowered.

Note: Warm-Up

1. Participants should spend time warming up before performing this test.

2. Participants should perform slow stretching movements, hold the exercise for 20 seconds, then repeat twice on each leg

   eg. a. modified hurdle stretch
   b. straddle sitting
   c. test itself

SIT AND REACH BOX CONSTRUCTION

1. Using 3/4" plywood, cut the following pieces:
   4 pieces 12 in. x 12 in.
   1 piece 12 in. x 21 in.

2. Assemble using nails or screws and glue.

3. Inscribe the top with one centimeter gradations. It is crucial that the 25 cm line be exactly in line with the vertical plane against which the subjects' feet will be placed.

4. A convenient carrying handle can be cut in the top panel.

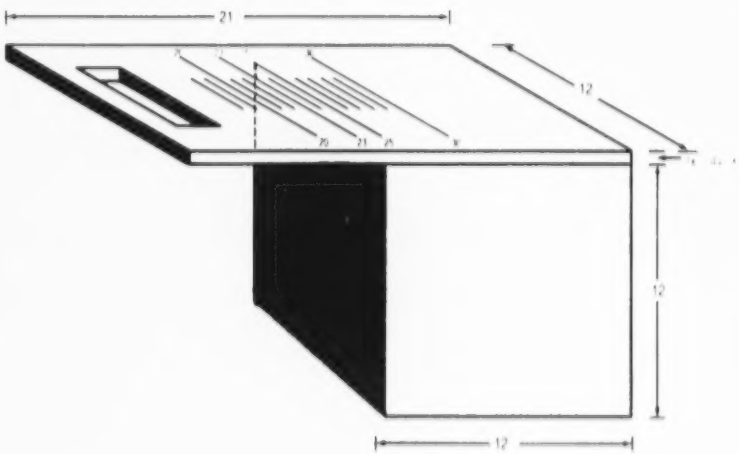
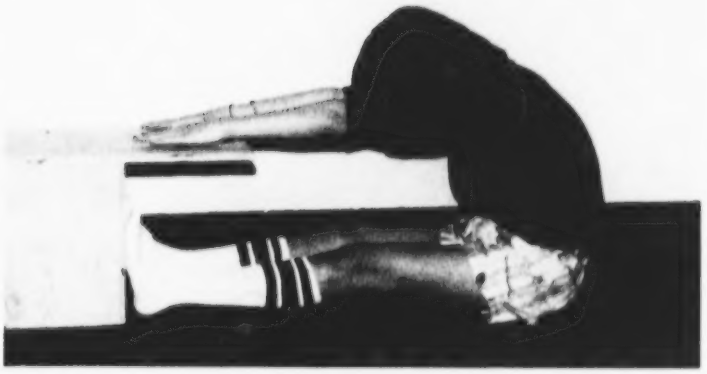


Illustration taken from AAHPERD Physical Best manual (Reston, VA: AAHPERD, 1988. p. 24). Used with permission from the American Alliance for Health, Physical Education, Recreation and Dance.



FLEXIBILITY

SIT AND REACH

WHITE - DESIRABLE LEVEL
RED - REQUIRES IMPROVEMENT
GRAPH INTERPRETATION SEE APPENDIX

DISTANCE

45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20

	M	F	M	F	M	F	M	F	M	F
AGE	9		10		11		12		13 - 18	

CARDIOVASCULAR ENDURANCE

DEFINITION

Cardiovascular endurance is the ability of the cardiovascular system to provide the working muscle with adequate oxygen during prolonged activity.

TEACHING CONCEPTS

PHYSIOLOGY

1. The body requires oxygen to produce energy during aerobic activity.

2. Oxygen requirements increase as activity increases.

3. Oxygen requirements and heart rate increase as activity levels increase.

4. The cardiovascular system (heart, blood, veins, arteries, lungs) carries food and oxygen to the working muscle and wastes away from the working muscle.

TRAINING PRINCIPLES

Overload

Exercise should be sufficiently intense to raise the pulse high enough (intensity 60% - 85% HR maximum) and sustain it long enough (duration 15-60 minutes) to get a training effect.

<u>Calculation of the Target Heart Rate</u>

The following formula is recommended. (Siegal 1988)

Step 1 220 - age = HR maximum
Step 2 HR max - HR rest = Trainable HR
Step 3 (Trainable HR x .6) + HR rest = Lower Value
Step 4 (Trainable HR x .85) + HR rest = Upper Value
Step 5 Target HR Range (THRR) = Lower to Upper Values

Note:
It is not necessary to calculate THRR for elementary children. Encourage children to move, run and play.

The purpose of target heart rate is to help students develop a proper pace instead of focusing on competition. Other methods of calculating THR are available.

TRAINING PRINCIPLES

Specificity

Exercise that will raise the pulse rate for a prolonged period of time. Activities such as:

Jogging	Skating	Swimming
Cycling	X-Country Skiing	Dancing

OR

Active participation in sports such as:

Basketball	Orienteering	Soft Lacrosse
Soccer	Racquet Sports	Ringette

Continuous rhythmic activities (aerobic) are more beneficial than stop and go activities (anaerobic).

Progression

Perform a continuous rhythmic activity

- Increase time - from 15 minutes to 20 minutes.
- Increase rate - run 1600 metres in 7 minutes instead of 8 minutes.
- Increase distance - go 4.8 kilometres instead of 3.2 kilometres.
- Increase frequency - 5 days/week instead of 3 days/week.

Regularity

To develop and maintain cardiovascular endurance, one must follow an overload program of continuous activity at least 3-5 days per week for the rest of one's life.

If training activities are discontinued, improved cardiovascular function begins to deteriorate.

BENEFITS

1. Decreased resting heart rate (RHR)
2. Increased stroke volume (SV)
3. Increased maximum heart rate (MHR)
4. Decreased heart rate at sub maximal workloads
5. Decreased recovery time
6. Decreased serum cholesterol levels
7. Increased metabolic rate during and after exercise bouts
8. Decreased total body fat
9. Decreased blood pressure

IMPLICATIONS

1. Risk Factors

   Risk factors are conditions or habits that can increase the chance of developing heart disease. The greater the number of risk factors, the greater the chances of contracting heart disease. Risk factors are cumulative.

2. Categories of Risk Factors

   a. Uncontrollable

      i. Sex
      ii. Age
      iii. Heredity

   b. Controllable

      i. High blood pressure
      ii. Serum cholesterol
      iii. Stress
      iv. Diabetes
      v. Obesity
      vi. Physical activity
      vii. Smoking

3. To Modify Risk Factors:

   a. Do activities you find enjoyable
   b. Attempt to modify one risk factor at a time

   All of us have some risk factors; we need to be aware of the uncontrollable factors and modify the controllable ones.

4. Participants in prolonged physical activity should be screened for medical disorders. Teachers should acquaint themselves with the disorder, its symptoms and emergency procedures in the event the student(s) experiences difficulty.

1600 METRE RUN

FITNESS COMPONENT MEASURED: CARDIOVASCULAR

EQUIPMENT: STOP WATCH, SCORE CARDS, PEN/PENCIL, 4 PYLONS (CONES)

> It is recommended that this activity be performed outdoors on a level, circular 400 metre area. A suitable substitute may be created in an open field area using pylons (cones). See "Administrative Suggestions" for more information. For valid results, the test should be conducted outdoors.

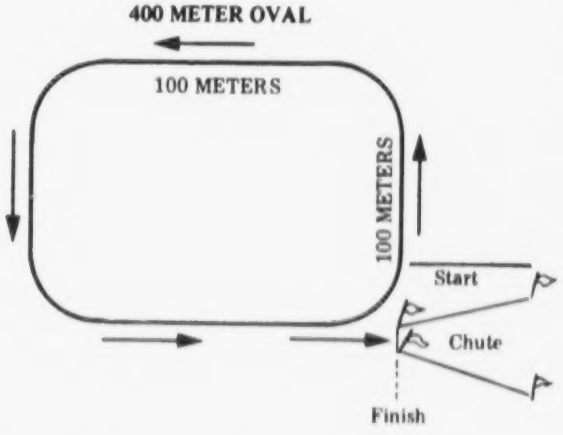
TEST DESCRIPTION (Methodology as listed)

1. Participants are instructed to run/walk 1600 meters (one mile) at an even pace.
2. Instructors must reinforce "pace" and honest personal effort. Staff and participants should offer verbal motivation throughout the performance. Walking is permitted, but the object of the test is to cover the required distance in the shortest possible time.
3. Participants must stretch and warm up before running.
4. Participants should practise running/walking the required distance prior to the performance day.
5. All runners start on the commands, "ready?...go."
6. Lap times should be given for each lap completed.
7. When the participants finish the distance, one official calls out the time, the runner's partner records the time.
8. Participants should be instructed to walk around slowly after the run for 2 to 5 minutes.
9. The elapsed time from the starting commands to the passage of the runner's torso (chest) across the finish line is scored to the nearest second.

ADMINISTRATIVE SUGGESTIONS

CAUTION - Be aware of medical problems, and their influence on participation.

1. Set up a "chute" at the finish line as illustrated in the diagram.



2. Test participants in groups:

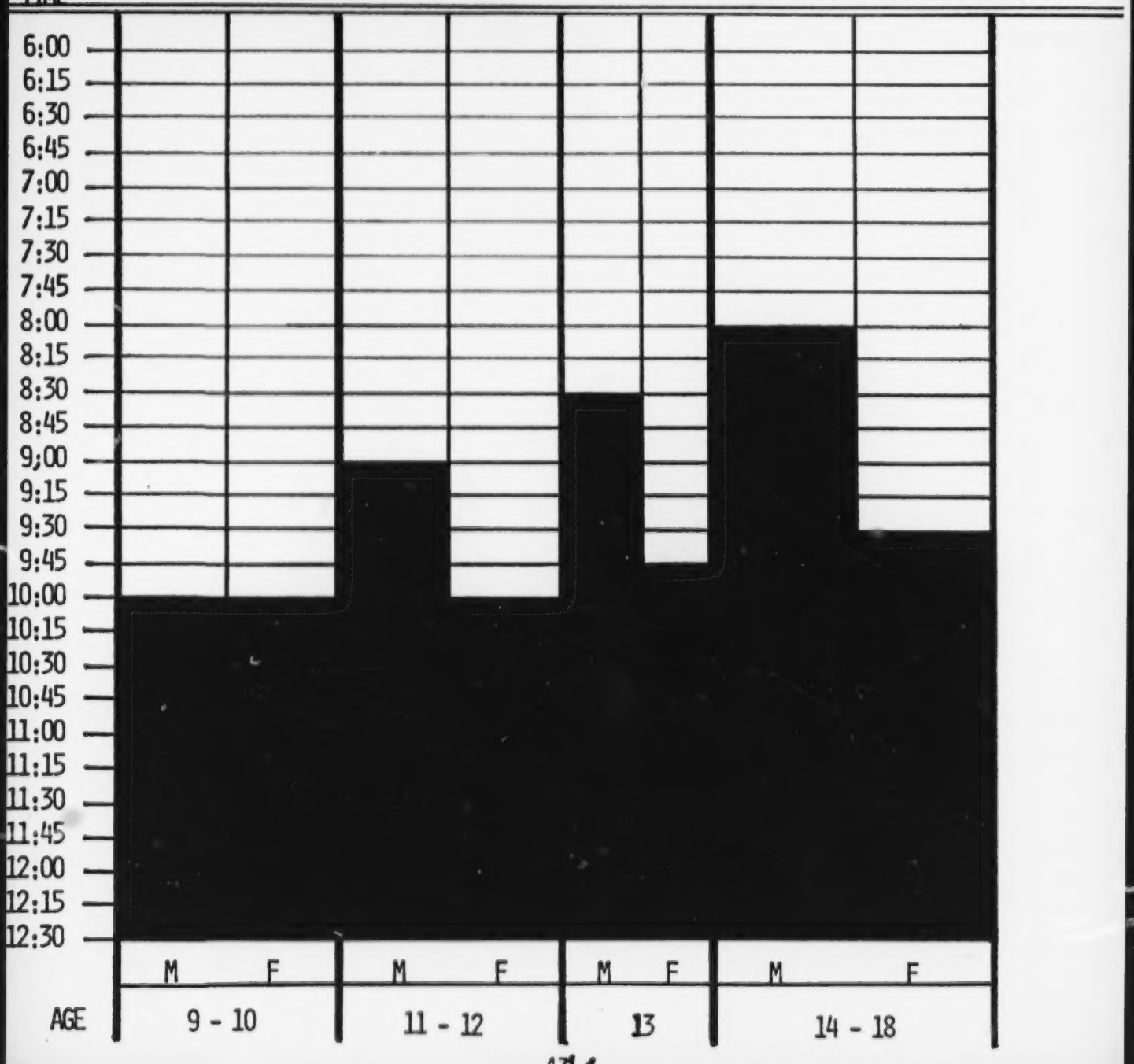
   12 participants run; their partners count the number of laps and record the time. After first group has completed the run, groups switch.

3. Appropriate dress will enhance performance.

CARDIOVASCULAR ENDURANCE

1600 METRE

WHITE - DESIRABLE LEVEL
RED - REQUIRES IMPROVEMENT
GRAPH INTERPRETATION SEE APPENDIX



SAMPLE STUDENT EVALUATION CARD

NAME _____ AGE (YRS) _____

SCHOOL _____ HEIGHT (CM) _____

GRADE _____ WEIGHT (KG) _____

	TRIAL 1		TRIAL 2		TRIAL 3	
	DATE _____		DATE _____		DATE _____	
Evaluation Item	Score	Level*	Score	Level*	Score	Level*
1600 Metre Run	____	____	____	____	____	____
Modified Sit-Up	____	____	____	____	____	____
Sit & Reach	____	____	____	____	____	____
Push-Up	____	____	____	____	____	____
Skinfolds						
Triceps	____	____	____	____	____	____
Calf	____	____	____	____	____	____
TOTAL	____	____	____	____	____	____

Compared to TRIAL 1, did I improve... on TRIAL 2 (Y/N)?____ on TRIAL 3 (Y/N)?___

* Refer to the score charts for each test item.

WHITE LEVEL: "Health Standard" achieved

RED LEVEL: Needs Improvement

MANITOBA SCHOOLS FITNESS

CLASS COMPOSITE RECORD

CLASS _____

NAME	Age	CARDIOVASCULAR (1600 Metre Run) Trial			ABDOMINAL STRENGTH AND ENDURANCE (Modified Sit-Up) Trial			FLEXIBILITY (Sit and Reach) Trial			MUSCLE STRENGTH AND ENDURANCE (Push-Up) Trial			BODY COMPOSITION (Skinfold Measurements) Trial		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3

GLOSSARY OF TERMS, REFERENCES AND APPENDIX

GLOSSARY OF TERMS

AEROBIC ACTIVITIES are those in which the body utilizes the oxygen consumed directly to manufacture energy as it is used. These activities are continuous, use whole body movements and are sustained over a long period of time.

ANAEROBIC ACTIVITIES are those of short bursts of intense activity which cannot be sustained for long periods of time. Anaerobic means "without oxygen." Examples:

1) Sprinting
2) Jumping for maximum height/distance
3) Weight training

FITNESS is state of health resulting from sound health characteristics and behaviour that enables a person to have the highest quality of life.

PHYSICAL FITNESS comprises the physical aspects of well being that are related to optimal functional capacity--ability to carry out daily work and leisure activities with enthusiasm.

HEALTH-RELATED FITNESS causes a reduction of health problems related to a lack of exercise and represents a commitment to lifelong fitness habits. The following health-related fitness components are related to degenerative conditions that may develop later in life:

Cardiovascular (Aerobic) Endurance

Ability of the cardiovascular system to provide the working muscle with adequate oxygen during prolonged activity.

Body Composition

The relative amounts of muscle, bone and fat in the body.

Flexibility

The ability of a joint to move through a full range of motion.

Muscle Strength

The maximum force that can be exerted in a single effort.

Muscle Endurance

The ability of a muscle or group of muscles to exert force over an extended period of time.

MOTOR FITNESS includes the following qualities or abilities that are related to physical skills:

Agility

The ability to change positions accurately and rapidly while moving within a space.

Speed

The ability to move through a space in a short period of time.

Power

The maximum strength applied in the shortest possible time.

Balance

The ability to maintain a state of equilibrium while moving or stationary.

Coordination

The ability to perform multiple tasks smoothly, successfully and simultaneously.

FITT PRINCIPLE constitutes guidelines that must be followed to ensure an adequate benefit is achieved from an aerobic exercise program:

Frequency

Number of workouts per week needed to reach a training effect, generally from 3-5.

Intensity

Difficulty of exercise, generally measured by heart rate, perceived exertion, or the "talk test."

Time

Duration of exercise necessary to reach training effect, generally from 15 to 20 minutes.

Type

Mode of exercise employed must involve over 50% of the body's muscle mass.

ADDITIONAL TRAINING PRINCIPLES

OVERLOAD: Any resistance that is greater than that usually encountered in daily living will result in a training adaptation.

SPECIFICITY: The exercise results obtained will be specific to the exercise performed (i.e., specific to the muscle and type of overload used).

PROGRESSION: Overload must be gradually increased as fitness improves in order that the body continues to be stressed and, therefore, to adapt.

TRAINING EFFECT: The level of exercise training that produces beneficial changes in physical fitness. A training effect can be obtained by following minimum recommendations for conditioning according to specific intensity, frequency, and duration guidelines.

TRAINING HEART RATE ZONE: The training heart rate level providing the minimum level for a training effect and the upper level of exercise intensity.

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APPENDIX

GRAPH INTERPRETATION

INTRODUCTION

For each of the core test items a colour-coded graph has been created to show students their current level of performance. The two colour codes represent the following "levels" of fitness:

RED - scores in this region represent a less than desirable level of fitness and indicate a need for improvement.

WHITE - scores in this region represent a "healthy" or desirable level of fitness. Students should be encouraged to achieve a minimum of the white level of fitness in each component.

READING THE GRAPHS

The vertical (up and down) segment of the graph indicates the number of repetitions or time value achieved for that component. The horizontal (bottom) line of the graph indicates both the sex and age group of the participant. To determine the students' performance level after the test score has been recorded:

- locate on the vertical axis the students' time or repetition score achieved on that item.
- look across the graph until this score intersects with a vertical point that corresponds to the students' age and sex grouping.
- find the colour segment that the score falls into; this represents the students' current level of fitness.
- repeat the same procedure for each of the core items.